

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/IT 02/00721	International filing date ( <i>day/month/year</i> ) 13.11.2002	Priority date ( <i>day/month/year</i> ) 13.11.2002
International Patent Classification (IPC) or both national classification and IPC B65H16/10, B65H16/10		
Applicant FABIO PERINI S.P.A.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 4 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  10.02.2004	Date of completion of this report  13.04.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Telephone No. +31 70 340-  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/IT 02/00721

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-14 as published

**Claims, Numbers**

1-15, 30 (part), 31-37 received on 10.02.2004 with letter of 03.02.2004

16-29, 30 (part) received on 11.03.2004 with letter of 10.03.2004

**Drawings, Sheets**

1/3-3/3 as published

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Yes: Claims	1-37
	No: Claims	
Inventive step (IS)	Yes: Claims	1-37
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-37
	No: Claims	

2. Citations and explanations

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/IT 02/00721

**Closest prior art**

US 5 472 153 (D1) is regarded as closest prior art and discloses an unwinding device according to the preamble of claim 1, i.e. an unwinding device with a peripheral drive unit, a central drive unit, and a control system to reciprocally coordinate the operation of said peripheral drive mechanism and said center drive mechanism.

**Problem**

An angular displacement of the outermost web material on the reel in relation to the central shaft of the reel may occur.

**Solution**

The control system acts on the operation of the speed of the centre drive mechanism to correct the angular displacement of the outermost web material.

**Inventive Step**

The subject matter of claims 1 and 23 has neither been disclosed by the prior art nor has it been rendered obvious.

AMENDMENTS UNDER ART. 34PCTClaims

1. An unwinding device for unwinding reels of web material wound around a central shaft and delivering said web material to a converting line,  
5 comprising:
- supports to support at least a reel in an unwinding position;
  - at least a peripheral drive mechanism which acts on the cylindrical surface of the reel being unwound and peripherally transmits to said reel a torque to draw it in rotation;
  - 10 – at least a center drive mechanism which transmits centrally to said reel an auxiliary torque to draw it in rotation in combination with the torque transmitted by said peripheral drive mechanism;
  - a control system to reciprocally coordinate operation of said peripheral drive mechanism and of said center drive mechanism;
- 15 characterized by comprising a detection system to detect, during unwinding, any angular displacement of the outermost web material on the reel in relation to the central shaft of the reel, the operation of said center drive mechanism being controlled so as to correct said angular displacement.
2. Device according to claim 1, characterized in that said control  
20 system controls at least an operating parameter of the center drive mechanism as a function of the unwinding conditions.
3. Device according to claim 2, characterized in that said control system controls the speed of the center drive mechanism.
4. Device according to one or more of the preceding claims,  
25 characterized in that the speed of said peripheral drive mechanism is controlled so as to maintain a set value of tension of the web material delivered by said reel, a tensioning sensor being associated with said control system.
5. Device according to claim 2, characterized in that said control  
30 system controls the torque applied by said center drive mechanism.
6. Device according to claim 5, characterized in that said control system is programmed to maintain the torque applied by said center drive

mechanism within a predetermined interval of values or at a predetermined value.

7. Device according to one or more of the preceding claims, characterized in that said control system acts on the speed of the center drive mechanism to correct said angular displacement.

8. Device according to one or more of the preceding claims, characterized in that it comprises: a first sensor to detect at least a first reference integral with the central shaft of said reel; and a second sensor to detect at least a second reference applied to the web material of the reel.

9. Device according to claim 8, characterized in that said second sensor is carried by a supporting arm of the peripheral drive mechanism.

10. Device according to one or more of the preceding claims, characterized in that it comprises a sensor to detect the diameter of said reel, associated with said control system.

11. Device according to claim 10, characterized in that said control system is programmed to control the center drive mechanism giving it an angular rotation speed determined as a function of the speed of the peripheral drive mechanism and of the diameter of the reel.

12. Device according to claim 11, characterized in that said control system is programmed to produce a feedback signal on said center drive mechanism, said feedback signal modifying the operation of the center drive mechanism as a function of the unwinding conditions.

13. Device according to one or more of the preceding claims, characterized in that said feedback signal is a function of said angular displacement.

14. Device according to claims 6 and 12, characterized in that said feedback signal is a function of the value of the torque applied to the reel by said center drive mechanism.

15. Device according to one or more of the preceding claims, characterized in that said peripheral drive mechanism comprises a belt and means which press said belt on the cylindrical external surface of the reel being unwound.

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16. Device according to one or more of the preceding claims, characterized in that said center drive mechanism comprises a shaft equipped with coupling means engageable and disengageable in relation to the central shaft of the reel.

5            17. Device according to claim 16, characterized in that said coupling means comprise a grooved coupling.

18. Device according to claim 16 or 17, characterized in that said shaft is axially mobile to engage and disengage from the central shaft of the reel.

10           19. Device according to claim 18, characterized in that said shaft is supported in a sleeve which slides axially inside a tubular element, said tubular element constituting the cylinder of a piston-cylinder actuator, of which said sleeve forms the moving piston.

15           20. Device according to claim 19, characterized in that a first gear is splined on said shaft, meshing with a second gear the toothing of which has an axial length sufficient to maintain the two gears in contact in any axial position of the shaft.

20           21. Device according to one or more of the preceding claims, characterized in that it comprises dual central end supports for at least two approximately axially aligned reels, with the center drive mechanisms for one and for the other of said reels being disposed between the supports for the two reels.

25           22. Device according to one or more of the previous claims, characterized in that said control system is programmed to disconnect one or the other of the peripheral and center drive mechanisms.

30           23 A method for unwinding a reel of web material and delivering said web material to a converting line, in which a first unwinding torque is applied peripherally to said reel through contact means with the cylindrical surface of the reel and a second unwinding torque is applied to the shaft of said reel, wherein said first and said second unwinding torque are reciprocally coordinated, characterized in that any angular displacement of the outermost web material wound on said reel in relation to the shaft of the reel is detected

and that the center drive mechanism is controlled as a function of said angular displacement.

24. Method according to claim 23, characterized in that: a peripheral drive mechanism is arranged in contact with the cylindrical surface of the reel and said first unwinding torque is applied through said peripheral drive mechanism; a center drive mechanism is arranged in connection with the shaft of the reel and said second unwinding torque is applied through said center drive mechanism.

25. Method according to claim 24, characterized in that at least an operating parameter of the center drive mechanism is controlled as a function of the unwinding conditions of the reel.

26. Method according to claim 25, characterized in that the rotation speed of said center drive mechanism is controlled.

27. Method according to claim 24 or 25, characterized in that the peripheral drive mechanism is controlled so as to maintain the tension of the web material delivered from said reel at a set value.

28. Method according to one or more of the claims from 24 to 27, characterized in that the second torque, applied to the shaft of the reel by said center drive mechanism, is controlled as a function of the unwinding conditions of the reel.

29. Method according to claim 28, characterized in that the second torque applied to the reel is controlled so as to maintain it within a pre-established interval or a pre-established value.

30. Method according to one or more of claims 24 to 29, characterized in that it comprises the phases of:

- detecting during rotation of said reel at least a first reference integral with the center shaft of said reel;
- detecting during rotation of said reel at least a second reference applied to the web material wound on said reel;
- detecting any variation in the angular distance between said first and said second reference and producing a feedback signal as a function of said variation;



- modifying an operating parameter of said center drive mechanism as a function of said feedback signal.

31. Method according to claim 30, characterized in that said first and said second reference are detected and said variation is determined at each  
5 turn of the reel.

32. Method according to claim 30 or 31, characterized in that said first reference is applied to each turn of the web material wound on said reel, the references on each turn being originally aligned along a same angular position.

10 33. Method according to one or more of the claims from 24 to 32, characterized in that:

- said peripheral drive mechanism is operated at a peripheral speed;
- the diameter of the reel is detected;
- an angular speed is calculated from said peripheral speed and from said  
15 diameter;
- the center drive mechanism is driven at said angular speed.

34. Method according to claim 33, characterized in that a feedback signal is produced to control said center drive mechanism, said feedback signal modifying the operating conditions of the center drive mechanism as a  
20 function of the unwinding conditions of the reel.

35. Method according to claim 29 and 34, characterized in that said feedback signal is produced as a function of said angular displacement.

36. Method according to claims 29 and 34, characterized in that said feedback signal is produced as a function of the second torque applied to said  
25 reel by said center drive mechanism.

37. Method according to one or more of the claims from 24 to 36, characterized in that said first torque is controlled so as to maintain the tension of the web material unwound from said reel substantially constant.